

Sustainability and Risk Practices

A blueprint for scaling voluntary carbon markets to meet the climate challenge

The trading of carbon credits can help companies—and the world—meet ambitious goals for reducing greenhouse-gas emissions. Here is what it would take to strengthen voluntary carbon markets so they can support climate action on a large scale.

by Christopher Blaufelder, Cindy Levy, Peter Mannion, and Dickon Pinner



More and more companies are pledging to help stop climate change by reducing their own greenhouse-gas emissions as much as they can. Yet many businesses find they cannot fully eliminate their emissions, or even lessen them as quickly as they might like. The challenge is especially tough for organizations that aim to achieve net-zero emissions, which means removing as much greenhouse gas from the air as they put into it. For many, it will be necessary to use carbon credits to offset emissions they can't get rid of by other means. The Taskforce on Scaling Voluntary Carbon Markets (TSVCM), sponsored by the Institute of International Finance (IIF) with knowledge support from McKinsey, estimates that demand for carbon credits could increase by a factor of 15 or more by 2030 and by a factor of up to 100 by 2050. Overall, the market for carbon credits could be worth upward of \$50 billion in 2030.

The market for carbon credits purchased voluntarily (rather than for compliance purposes) is important for other reasons, too. Voluntary carbon credits direct private financing to climate-action projects that would not otherwise get off the ground. These projects can have additional benefits such as biodiversity protection, pollution prevention, public-health improvements, and job creation. Carbon credits also support investment into the innovation required to lower the cost of emerging climate technologies. And scaled-up voluntary carbon markets would facilitate the mobilization of capital to the Global South, where there is the most potential for economical nature-based emissions-reduction projects.¹

Given the demand for carbon credits that could ensue from global efforts to reduce greenhouse-gas emissions, it's apparent that the world will need a voluntary carbon market that is large, transparent, verifiable, and environmentally robust. Today's market, though, is fragmented and complex. Some credits have turned out to represent emissions reductions that were questionable at best. Limited pricing data make it challenging for buyers to know

whether they are paying a fair price, and for suppliers to manage the risk they take on by financing and working on carbon-reduction projects without knowing how much buyers will ultimately pay for carbon credits. In this article, which is based on McKinsey's research for a new report by the TSVCM, we look at these issues and how market participants, standard-setting organizations, financial institutions, market-infrastructure providers, and other constituencies might address them to scale up the voluntary carbon market.

Carbon credits can help companies to meet their climate-change goals

Under the 2015 Paris Agreement, nearly 200 countries have endorsed the global goal of limiting the rise in average temperatures to 2.0 degrees Celsius above preindustrial levels, and ideally 1.5 degrees. Reaching the 1.5-degree target would require that global greenhouse-gas emissions are cut by 50 percent of current levels by 2030 and reduced to net zero by 2050. More companies are aligning themselves with this agenda: in less than a year, the number of companies with net-zero pledges doubled, from 500 in 2019 to more than 1,000 in 2020.²

To meet the worldwide net-zero target, companies will need to reduce their own emissions as much as they can (while also measuring and reporting on their progress, to achieve the transparency and accountability that investors and other stakeholders increasingly want). For some companies, however, it's prohibitively expensive to reduce emissions using today's technologies, though the costs of those technologies might go down in time. And at some businesses, certain sources of emissions cannot be eliminated. For example, making cement at industrial scale typically involves a chemical reaction, calcination, which accounts for a large share of the cement sector's carbon emissions. Because of these limitations, the emissions-

¹ To learn more about how carbon credits and carbon markets work, see Christopher Blaufelder, Joshua Katz, Cindy Levy, Dickon Pinner, and Jop Weterings, "How the voluntary carbon market can help address climate change," December 2020, McKinsey.com.

² Angel Hsu et al., *Accelerating net zero: Exploring cities, regions, and companies' pledges to decarbonize*, Data-Driven EnviroLab & NewClimate Institute, September 2020, datadrivenlab.org.

reduction pathway to a 1.5-degree warming target effectively requires “negative emissions,” which are achieved by removing greenhouse gases from the atmosphere (Exhibit 1).

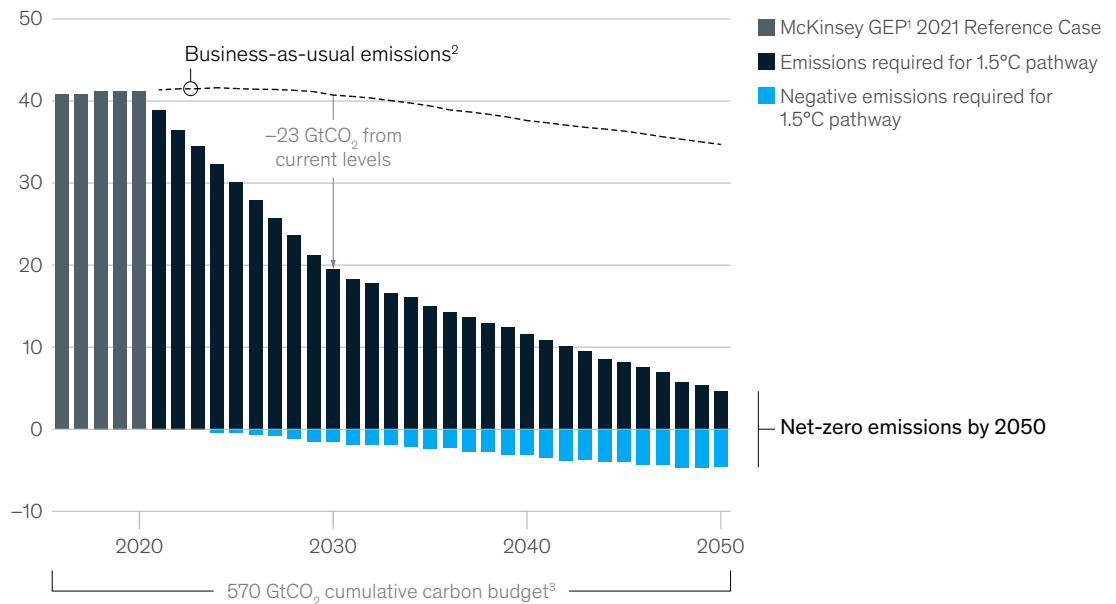
Purchasing carbon credits is one way for a company to address emissions it is unable to eliminate. Carbon credits are certificates representing quantities of greenhouse gases that have been kept out of the air or removed from it. While carbon credits have been in use for decades, the voluntary market for carbon credits has grown significantly in recent years. McKinsey estimates that in 2020, buyers retired carbon credits for some 95 million tons of carbon-dioxide equivalent (MtCO₂e), which would be more than twice as much as in 2017.

As efforts to decarbonize the global economy increase, demand for voluntary carbon credits could continue to rise. Based on stated demand for carbon credits, demand projections from experts surveyed by the TSVCM, and the volume of negative emissions needed to reduce emissions in line with the 1.5-degree warming goal, McKinsey estimates that annual global demand for carbon credits could reach up to 1.5 to 2.0 gigatons of carbon dioxide (GtCO₂) by 2030 and up to 7 to 13 GtCO₂ by 2050 (Exhibit 2). Depending on different price scenarios and their underlying drivers, the market size in 2030 could be between \$5 billion and \$30 billion at the low end and more than \$50 billion at the high end.³

Exhibit 1

Reaching the 1.5-degree warming target could require a large quantity of negative emissions, including some generated using carbon credits.

Global carbon-dioxide emissions, gigatons (GtCO₂) per year



¹Global Energy Perspective.

²While emissions fell by a quarter at the peak of COVID-19-related lockdowns, daily emissions have rebounded to be only 5% lower than 2019 levels. Scenarios to 2050 remain the same. Forster et al., “Current and future global climate impacts resulting from COVID-19,” *Nature Climate Change*, August 7, 2020, nature.com.

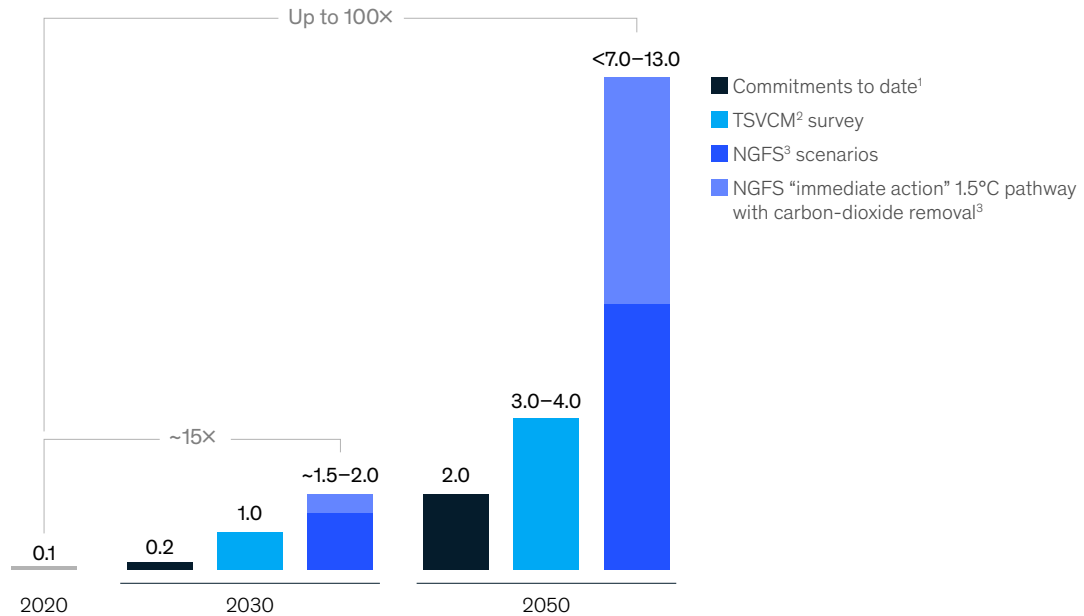
³Budget of 570 GtCO₂ emissions from 2018 onward offers a 66% chance of limiting global warming to 1.5°C, when assessing historical temperature increases from a blend of air and sea-surface temperatures. Source: Corinne Le Quéré et al., “Global Carbon Budget 2018,” *Earth Systems Science Data*, 2018, Volume 10, Number 4, pp. 2141–94, doi.org; IPCC; McKinsey Global Energy Perspective 2021; McKinsey analysis

³ Both ranges assume that demand will amount to 1–2 GtCO₂ in 2030 (using the TSVCM survey estimate of 1 GtCO₂ as a lower bound and the Network for Greening the Financial System scenario estimate of 2 GtCO₂ as an upper bound). The low-end estimate of \$5 billion to \$30 billion represents a scenario where buyers purchase the historical surplus of carbon credits and then acquire the lowest-cost credits available; the high-end estimate of more than \$50 billion represents a scenario in which most buyers opt to purchase credits from local suppliers only, even at a premium.

Exhibit 2

Global demand for voluntary carbon credits could increase by a factor of 15 by 2030 and a factor of 100 by 2050.

Voluntary demand scenarios for carbon credits, gigatons per year



¹These amounts reflect demand established by climate commitments of more than 700 large companies. They are lower bounds because they do not account for likely growth in commitments and do not represent all companies worldwide.

²TSVCM = Taskforce on Scaling Voluntary Carbon Markets. These amounts reflect demand based on a survey of subject-matter experts in the TSVCM.

³NGFS = Network for Greening the Financial System. These amounts reflect demand based on carbon-dioxide removal and sequestration requirements under the NGFS's 1.5°C and 2.0°C scenarios. Both amounts reflect an assumption that all carbon-dioxide removal and sequestration results from carbon credits purchased on the voluntary market (whereas some removal and sequestration will result from carbon credits purchased in compliance markets and some will result from efforts other than carbon-offsetting projects).

Source: NGFS; TSVCM; McKinsey analysis

While the increase in demand for carbon credits is significant, analysis by McKinsey indicates that demand in 2030 could be matched by the *potential* annual supply of carbon credits: 8 to 12 GtCO₂ per year.

These carbon credits would come from four categories: avoided nature loss (including deforestation); nature-based sequestration, such as reforestation; avoidance or reduction of emissions such as methane from landfills; and technology-based removal of carbon dioxide from the atmosphere.

However, several factors could make it challenging to mobilize the entire potential supply and bring it to market. The development of projects would have to ramp up at an unprecedented rate. Most of the potential supply of avoided nature loss and of nature-based sequestration is concentrated in a small number of countries. All projects come with risks, and many types could struggle to attract financing because of the long lag times between the

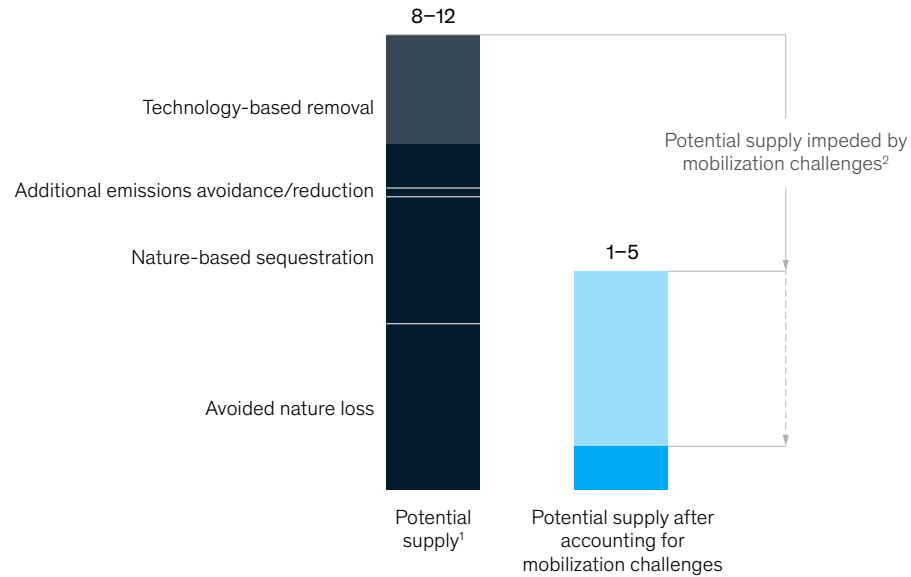
initial investment and the eventual sale of credits. Once these challenges are accounted for, the estimated supply of carbon credits drops to 1 to 5 GtCO₂ per year by 2030 (Exhibit 3).

These aren't the only problems facing buyers and sellers of carbon credits, either. High-quality carbon credits are scarce because accounting and verification methodologies vary and because credits' co-benefits (such as community economic development and biodiversity protection) are seldom well defined. When verifying the quality of new credits—an important step in maintaining the market's integrity—suppliers endure long lead times. When selling those credits, suppliers face unpredictable demand and can seldom fetch economical prices. Overall, the market is characterized by low liquidity, scarce financing, inadequate risk-management services, and limited data availability.

Exhibit 3

While there is an ample potential supply of carbon credits, several challenges could prevent this supply from reaching the market.

Potential supply of carbon credits in 2030, gigatons per year



¹Estimates of the potential supply from each category were developed using conservative methodologies. The upper end of the range for "practical" potential supply (12 GtCO₂e per year) slightly exceeds the total of the estimated supplies from each category to reflect the possibility that supply will be greater than estimated.

²Key mobilization challenges include the rate and complexity of scaling up carbon-offsetting efforts, the geographic concentration of carbon-offsetting opportunities, risks to the carbon market, and the difficulty of attracting financing. Source: Taskforce on Scaling Voluntary Carbon Markets; McKinsey analysis

These challenges are formidable but not insurmountable. Verification methodologies could be strengthened, and verification processes streamlined. Clearer demand signals would help give suppliers more confidence in their project plans and encourage investors and lenders to provide with financing. And all these requirements could be met through the careful development of an effective, large-scale voluntary carbon market.

Scaling up voluntary carbon markets requires a new blueprint for action

Building an effective voluntary carbon market will require concerted effort across a number of fronts. In its report, the TSVCM identified six areas, spanning the carbon-credit value chain, where action can support the scaling up of the voluntary carbon market.

Creating shared principles for defining and verifying carbon credits

Today's voluntary carbon market lacks the liquidity necessary for efficient trading, in part because carbon credits are highly heterogeneous. Each credit has attributes associated with the underlying project, such as the type of project or the region where it was carried out. These attributes affect the price of the credit, because buyers value additional attributes differently. Overall, the inconsistency among credits means that matching an individual buyer with a corresponding supplier is a time-consuming, inefficient process transacted over the counter.

The matching of buyers and suppliers would be more efficient if all credits could be described through common features. The first set of features has to do with quality. Quality criteria, set out in "core carbon

principles,” would provide a basis for verifying that carbon credits represent genuine emissions reductions. The second set of features would cover the additional attributes of the carbon credit. Standardizing those attributes in a common taxonomy would help sellers to market credits and buyers to find credits that meet their needs.

Developing contracts with standardized terms

In the voluntary carbon market, the heterogeneity of carbon credits means that credits of particular types are being traded in volumes too small to generate reliable daily price signals. Making carbon credits more uniform would consolidate trading activity around a few types of credits and also promote liquidity on exchanges.

After the establishment of the core carbon principles and standard attributes described above, exchanges could create “reference contracts” for carbon trading. Reference contracts would combine a core contract, based on the core carbon principles, with additional attributes that are defined according to a standard taxonomy and priced separately. Core contracts would make it easier for companies to do things such as purchasing large quantities of carbon credits at once: they could make bids for credits that meet certain criteria, and the market would aggregate smaller quantities of credits to match their bids.

Another benefit of reference contracts would be the development of a clear daily market price. Even after reference contracts are developed, many parties will continue to make trades over the counter (OTC). Prices for credits traded using reference contracts could establish a starting point for the negotiation of OTC trades, with other attributes priced separately.

Establishing trading and post-trade infrastructure

A resilient, flexible infrastructure would enable the voluntary carbon market to function effectively: to accommodate high-volume listing and trading of reference contracts, as well as contracts reflecting a limited, consistently defined set of additional attributes. This, in turn, would support the creation of structured finance products for project developers.

Post-trade infrastructure, comprising clearinghouses and meta-registries, is also necessary. Clearinghouses would support the development of a futures market and provide counterparty default protection. Meta-registries would provide custodian-like services for buyers and suppliers and enable the creation of standardized issuance numbers for individual projects (similar to the International Securities Identification Number, or ISIN, in capital markets).

In addition, an advanced data infrastructure would promote the transparency of reference and market data. Sophisticated and timely data are essential for all environmental and capital markets. Transparent reference and market data are not readily available now because access to data is limited and the OTC market is difficult to track. Buyers and suppliers would benefit from new reporting and analytics services that consolidate openly accessible reference data from multiple registries, through APIs.

Creating consensus about the proper use of carbon credits

A measure of skepticism attends the use of credits in decarbonization. Some observers question whether companies will extensively reduce their own emissions if they have the option to offset emissions instead. Companies would benefit from clear guidance on what would constitute an environmentally sound offsetting program as part of an overall push toward net-zero emissions. Principles for the use of carbon credits would help ensure that carbon offsetting does not preclude other efforts to mitigate emissions and does result in more carbon reductions than would take place otherwise.

Under such principles, a company would first establish its need for carbon credits by disclosing its greenhouse-gas emissions from all operations, along with its targets and plans for reducing emissions over time. To compensate for emissions from sources that it can eventually eliminate, the company might purchase and “retire” carbon credits (claiming the reductions as their own and taking the credits off the market, so that another organization can’t claim the same reductions). It could also use carbon credits to neutralize the so-called residual emissions that it wouldn’t be able to eliminate in the future.

Installing mechanisms to safeguard the market's integrity

Concerns about the integrity of the voluntary carbon market impede its growth in several ways. First, the heterogeneous nature of credits creates potential for errors and fraud. The market's lack of price transparency also creates the potential for money laundering.

One corrective measure would be establishing a digital process by which projects are registered and credits are verified and issued. Verification entities should be able to track a project's impact at regular intervals, not just at the end. A digital process could lower issuance costs, shorten payment terms, accelerate credit issuance and cash flow for project developers, allow credits to be traced, and improve the credibility of corporate claims related to the use of offsets.

Other improvements would be the implementation of anti-money-laundering and know-your-customer guidelines to stop fraud, and the creation of a governance body to ensure the eligibility of market participants, supervise their conduct, and oversee the market's functioning.

Transmitting clear signals of demand

Finding effective ways for buyers of carbon credits to signal their future demand would help encourage project developers to increase the supply of carbon credits. Long-term demand signals might arrive in the form of commitments to reduce greenhouse-gas emissions or as up-front agreements with project

developers to buy carbon credits from future projects. Medium-term demand might be recorded in a registry of commitments to purchase carbon credits.

Other potential ways to promote demand signals include consistent, widely accepted guidelines for companies on accepted uses of carbon credits to offset emissions; more industry-wide collaboration, whereby consortiums of companies might align their emissions-reduction goals or set out shared goals; and better standards and infrastructure for the development and sale of consumer-oriented carbon credits.

Limiting the rise of global temperatures to 1.5 degrees Celsius will require a rapid, drastic reduction in net greenhouse-gas emissions. While companies and other organizations can achieve much of the necessary reduction by adopting new technologies, energy sources, and operating practices, many will need to use carbon credits to supplement their own abatement efforts to achieve net-zero emissions. A robust, effective voluntary market for carbon credits would make it easier for companies to locate trustworthy sources of carbon credits and complete the transactions for them. Just as important, such a market would be able to transmit signals of buyers' demand, which would in turn encourage sellers to increase supplies of credits. By enabling more carbon offsetting to take place, a voluntary carbon market would support progress toward a low-carbon future.

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